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EXAMINER	
LAO, TIM P	

ART UNIT	PAPER NUMBER
2655	6

DATE MAILED: 12/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/852,235	TANIGUCHI ET AL.	
	Examiner	Art Unit	
	Tim Lao	2655	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-27 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) 24-27 is/are allowed.

6)☒ Claim(s) 1-23 is/are rejected.

7)☒ Claim(s) 10-18 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Objections

1. Claims 6, 8, and 10-18 are objected to because of the following informalities:

Regarding claim 6, line 5, the word "sand" should be changed to -- said --.

Regarding claim 8, line 5, the word "sand" should be changed to -- said --.

Claim 10 recites "...decoding algorithm at the speech encoder." in the 3rd ¶ and claim 11 recites "...with used rate (decoding rate) at the speech encoder." in the 3rd ¶. Referring to Fig. 13 of the drawings; page 58, 3rd ¶ and page 59 of the specification, as best understood from the drawings and specification, the decoding algorithm and decoding rate are associated with the decoding section of the speech decoder, not the speech encoder. The examiner will assume this association in determining the validity of claims 10-18. It is suggested that "speech encoder" be changed to -- speech decoder --.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-9, 19-21 are rejected under 35 U.S.C. 102(e) as being anticipated by Mauro (US Patent No. 6,122,384).

Regarding claim 1, Mauro discloses:

a signal processing apparatus (Fig.1, 100) comprising:

a noise suppressor (Fig.1, 108) having a plurality of different noise suppression characteristics (col.1, L.26-36; col.2, L.26-34, col.3, L.16-37), suppressing background noise contained in a speech signal (col.3, L.60-63). [The use of spectral subtraction technique in noise suppression to determine, in a frequency band, the signal-to-noise ratio (SNR), the channel gains, and channel gain adjustment is indicative of the presence of different noise suppression characteristics of the noise suppressor.]

a speech encoder having a plurality of different coding algorithm (rate decision algorithm), encoding the suppressed speech signal by using one of said different coding algorithm (col.5, L.58-65; col.6, L.2-13, L.23-24); [Different coding algorithms within the variable rate vocoder can be used to select one of the four rates, i.e., one algorithm to select the 171 information bits per 20ms rate (8.5Kbps), another algorithm to select the 80 information bits per 20ms rate (4Kbps), etc...] and

wherein said noise suppressor selects one noise suppression characteristic in accordance with the used coding algorithm at the speech encoder. [Rate determination provides information on the presence and absence of speech (col.6, L.14-23). This rate determination information is provided to the noise suppressor 108 by the variable rate vocoder (col.6, L.57-59). The presence and absence of speech (signal and noise energy) is used to determine SNR (col.2, L.55-60) and thus the channel gains and

channel gain adjustment (col.1, L26-36; col.2, L.26-34). The use of spectral subtraction technique in noise suppression to determine, in a frequency band, the signal-to-noise ratio (SNR), the channel gains, and channel gain adjustment is indicative of the presence of different noise suppression characteristics of the noise suppressor. Therefore, it can be seen that the determining or selecting of noise suppression characteristic is based on the used coding algorithm (rate information).]

Regarding claim 2, Mauro discloses:

a signal processing apparatus (Fig.1, 100) comprising:

a noise suppressor (Fig.1, 108) having a plurality of different noise suppression characteristics (col.1, L.26-36; col.2, L.26-34, col.3, L.16-37), suppressing background noise contained in a speech signal (col.3, L.60-63). [The use of spectral subtraction technique in noise suppression to determine, in a frequency band, the signal-to-noise ratio (SNR), the channel gains, and the channel gain adjustment is indicative of the presence of different noise suppression characteristics of the noise suppressor.]

a speech encoder having a plurality of different coding rates (variable rate), encoding the suppressed speech signal by using one of said different coding rates (col.5, L.58-65; col.6, L2-13); [The variable rate vocoder may use one of the four rates, 16, 40, 80, or 171 information bits in 20ms data frames (0.8Kbps, 2Kbps, 4Kbps, or 8.5Kbps) to encode the data.] and

wherein said noise suppressor selects one noise suppression characteristic in accordance with the used coding rate at the speech encoder. [Rate determination provides information on the presence and absence of speech (col.6, L.14-23). This rate

determination information is provided to the noise suppressor 108 by the variable rate vocoder (col.6, L.57-59). The presence and absence of speech (signal and noise energy) is used to determine SNR (col.2, L.55-60) and thus the channel gains and channel gain adjustment (col.1, L26-36; col.2, L.26-34). The use of spectral subtraction technique in noise suppression to determine, in a frequency band, the signal-to-noise ratio (SNR), the channel gains, and the channel gain adjustment is indicative of the presence of different noise suppression characteristics of the noise suppressor. Therefore, it can be seen that the determining or selecting of noise suppression characteristic is based on the used coding rate.]

Regarding claim 3, Mauro shows:

the signal processing apparatus according to claim 2, wherein the noise suppressor comprising a frequency divider dividing the speech signal into several speech signals, each of the speech signals having a different frequency band (col.1, L.26-30), said noise suppressor only suppressing background noise contained in the speech signal having a predetermined frequency band (For gains: Fig.3; col.3, L.20-28; col.10, L.40-42; For energy: col.5, L.36-46) if the speech encoder selects a predetermined coding rate (16, 40, 80, or 171 information bits in 20ms data frames) for encoding the speech signal (col.5, L.58-60. col.6, L.7-10).

Regarding claim 4, Mauro shows:

the signal processing apparatus according to claim 2, wherein the noise suppressor comprising a frequency divider dividing the speech signal into several speech signals, each of the speech signals having a different frequency band (col.1,

L.26-30), said noise suppressor stops suppressing background noise contained in the speech signal having a predetermined frequency band (For gains: Fig.3; col.3, L.20-28; col.10, L.40-42; For energy: col.5, L.36-46) if the speech encoder selects a predetermined coding rate (16, 40, 80, or 171 information bits in 20ms data frames) for encoding the speech signal (col.5, L.58-60. col.6, L.7-10). [If the noise suppressor only suppresses background noise within the predetermined frequency band, then it would not suppress background noise in a different or outside of the predetermined frequency band.]

Regarding claim 5, Mauro shows:

the signal processing apparatus according to claim 2, wherein the noise suppressor stops suppressing background noise contained in the speech signal (For gains: Fig.3; col.3, L.20-28; col.10, L.40-42; For energy: col.5, L.36-46) if the speech encoder selects a predetermined coding rate (16, 40, 80, or 171 information bits in 20ms data frames) for encoding the speech signal (col.5, L.58-60. col.6, L.7-10). [If the noise suppressor only suppresses background noise within the predetermined frequency band, then it would not suppress background noise in a different or outside of the predetermined frequency band.]

Regarding claim 6, Mauro shows:

the signal processing apparatus according to claim 1, wherein the noise suppressor comprising a parameter setting means (col.10, L.8-13) for setting a parameter so as to select an optimal noise suppression characteristic, said parameters varies the noise suppression characteristics (col.10, L.13-29). [Look-up table contains

channel gain parameters. Using gain parameters according to a frequency band from multiple bands provide less voice quality degradation (i.e., optimal noise suppression characteristic selection based on parameter setting.)]

Regarding claim 7, Mauro shows:

the signal processing apparatus according to claim 1, wherein said parameters are set in accordance with the used coding algorithm at the speech encoder. [Rate determination provides information on the presence and absence of speech (col.6, L.14-23). This rate determination information is provided to the noise suppressor 108 by the variable rate vocoder (col.6, L.57-59). The presence and absence of speech (signal and noise energy) is used to determine SNR (col.2, L.55-60) and thus the channel gains and channel gain adjustment (col.1, L26-36; col.2, L.26-34). Look-up table contains channel gain parameters (col.10, L.8-13). Therefore, it can be seen that channel gain parameters are determined in accordance with the coding algorithm (rate information).]

Regarding claim 8, Mauro shows:

the signal processing apparatus according to claim 2, wherein the noise suppressor comprising a parameter setting means (col.10, L.8-13) for setting a parameter so as to select an optimal noise suppression characteristic, said parameters varies the noise suppression characteristics (col.10, L.13-29). [Look-up table contains channel gain parameters. Using gain parameters according to a frequency band from multiple bands provide less voice quality degradation (i.e., optimal noise suppression characteristic selection based on parameter setting.)]

Regarding claim 9, Mauro shows:

the signal processing apparatus according to claim 2, wherein said parameters are set in accordance with the used coding algorithm at the speech encoder. [Rate determination provides information on the presence and absence of speech (col.6, L.14-23). This rate determination information is provided to the noise suppressor 108 by the variable rate vocoder (col.6, L.57-59). The presence and absence of speech (signal and noise energy) is used to determine SNR (col.2, L.55-60) and thus the channel gains and channel gain adjustment (col.1, L26-36; col.2, L.26-34). Look-up table contains channel gain parameters (col.10, L.8-13). Therefore, it can be seen that channel gain parameters are determined in accordance with the coding algorithm (rate information).]

Regarding claim 19, Mauro discloses:

a signal processing apparatus (Fig.1, 100) comprising:

a noise suppressor (Fig.1, 108) having a plurality of different noise suppression characteristics (col.1, L.26-36; col.2, L.26-34, col.3, L.16-37), suppressing background noise contained in a speech signal (col.3, L.60-63). [The use of spectral subtraction technique in noise suppression to determine, in a frequency band, the signal-to-noise ratio (SNR), the channel gains, and channel gain adjustment is indicative of the presence of different noise suppression characteristics of the noise suppressor.]

hands-free and non-hands-free function may be selectively used (col.4, L.11-14).

Regarding claim 20, Mauro shows:

the signal processing apparatus according to claim 19, wherein the noise suppressor comprising a parameter setting means (col.10, L.8-13) for setting a parameter so as to select an optimal noise suppression characteristic, said parameters

varies the noise suppression characteristics (col.10, L.13-29). [Look-up table contains channel gain parameters. Using gain parameters according to a frequency band from multiple bands provide less voice quality degradation (i.e., optimal noise suppression characteristic selection based on parameter setting.)]

Regarding claim 21, Mauro shows:

the signal processing apparatus according to claim 20, wherein said parameter is set in accordance with the use of the hands-free function (col.4, L.11-14).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 10-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gao et al. (US Patent No. 6,604,070 B1) in view of Mauro.

Regarding claim 10, Gao et al. show:

a speech decoder having a plurality of different decoding algorithm, decoding the encoded speech signal by using the different decoding algorithm (Fig.1, 16; col.7, L.4-7, L.52-59; col.56, L.9-11, L.39-41); [An algorithm may be used to select one of the codecs.]

Gao et al. do not show:

a noise suppressor having a plurality of different noise suppression characteristics suppressing background noise contained in a speech signal.

a noise suppressor selecting one noise suppression characteristic in accordance with the used coding algorithm.

However, Mauro teaches:

a noise suppressor (Fig.1, 108) having a plurality of different noise suppression characteristics (col.1, L.26-36; col.2, L.26-34, col.3, L.16-37), suppressing background noise contained in a speech signal (col.3, L.60-63). [The use of spectral subtraction technique in noise suppression to determine, in a frequency band, the signal-to-noise ratio (SNR), the channel gains, and channel gain adjustment is indicative of the presence of different noise suppression characteristics of the noise suppressor.]

a noise suppressor selecting one noise suppression characteristic in accordance with the used coding algorithm. [Rate determination provides information on the presence and absence of speech (col.6, L.14-23). This rate determination information is provided to the noise suppressor 108 by the variable rate vocoder (col.6, L.57-59). The presence and absence of speech (signal and noise energy) is used to determine SNR (col.2, L.55-60) and thus the channel gains and channel gain adjustment (col.1, L26-36; col.2, L.26-34). The use of spectral subtraction technique in noise suppression to determine, in a frequency band, the signal-to-noise ratio (SNR), the channel gains, and channel gain adjustment is indicative of the presence of different noise suppression characteristics of the noise suppressor. Therefore, it can be seen that the determining

or selecting of noise suppression characteristic is based on the used coding algorithm (rate information).]

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the decoding system of Gao et al. to include the noise suppression method of Mauro in order to use a noise suppressor to suppress noise in the decoded speech signal and to select a noise suppression characteristic in accordance with the used decoding algorithm. Noise suppression of the decoded speech signal may yield a reconstructed speech signal with improved quality.

Regarding claim 11, Gao et al. show:

a speech decoder having a plurality of different decoding rate (8.5Kbps, 4.0Kbps, 2.0Kbps, 0.8Kbps), decoding the encoded speech signal by using the different decoding rate (Fig.1, 16; col.7, L.4-7, L.52-59; col.56, L.9-11, L.39-41);

Gao et al. do not show:

a noise suppressor having a plurality of different noise suppression characteristics suppressing background noise contained in a speech signal.

a noise suppressor selecting one noise suppression characteristic in accordance with the used coding rate.

However, Mauro teaches:

a noise suppressor (Fig.1, 108) having a plurality of different noise suppression characteristics (col.1, L.26-36; col.2, L.26-34, col.3, L.16-37), suppressing background noise contained in a speech signal (col.3, L.60-63). [The use of spectral subtraction technique in noise suppression to determine, in a frequency band, the signal-to-noise

ratio (SNR), the channel gains, and the channel gain adjustment is indicative of the presence of different noise suppression characteristics of the noise suppressor.]

a noise suppressor selecting one noise suppression characteristic in accordance with the used coding rate. [Rate determination provides information on the presence and absence of speech (col.6, L.14-23). This rate determination information is provided to the noise suppressor 108 by the variable rate vocoder (col.6, L.57-59). The presence and absence of speech (signal and noise energy) is used to determine SNR (col.2, L.55-60) and thus the channel gains and channel gain adjustment (col.1, L26-36; col.2, L.26-34). The use of spectral subtraction technique in noise suppression to determine, in a frequency band, the signal-to-noise ratio (SNR), the channel gains, and the channel gain adjustment is indicative of the presence of different noise suppression characteristics of the noise suppressor. Therefore, it can be seen that the determining or selecting of noise suppression characteristic is based on the used coding rate.]

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the decoding system of Gao et al. to include the noise suppression method of Mauro in order to use a noise suppressor to suppress noise in the decoded speech signal and to select a noise suppressor to suppress noise in the decoded speech signal and to select a noise suppression characteristic in accordance with the used decoding rate. Noise suppression of the decoded speech signal may yield a reconstructed speech signal with improved quality.

Regarding claims 12-14, Gao et al. show:

a speech decoder having a predetermined rate (8.5Kbps, 4.0Kbps, 2.0Kbps, 0.8Kbps), decoding the encoded speech signal by using the different predetermined rate (Fig.1, 16; col.7, L.4-7, L.52-59; col.56, L.9-11, L.39-41).

Gao et al. do not show:

a noise suppressor only suppress the noise component contained in the speech signal having a predetermined frequency band;

a noise suppressor stops suppressing background noise contained in the speech signal having a predetermined frequency band.

However, Mauro teaches:

a noise suppressor only suppress the noise component contained in the speech signal having a predetermined frequency band (For gains: Fig.3; col.3, L.20-28; col.10, L.40-42; For energy: col.5, L.36-46) if the speech encoder selects a predetermined rate (0.8Kbps, 2.0Kbps, 4.0Kbps, 8.5Kpbs) for encoding the speech signal.

a noise suppressor stops suppressing background noise contained in the speech signal having a predetermined frequency band (For gains: Fig.3; col.3, L.20-28; col.10, L.40-42; For energy: col.5, L.36-46) if the speech encoder selects a predetermined coding rate (16, 40, 80, or 171 information bits in 20ms data frames) for encoding the speech signal (col.5, L.58-60. col.6, L.7-10). [If the noise suppressor only suppresses background noise within the predetermined frequency band, then it would not suppress background noise in a different or outside of the predetermined frequency band.]

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the decoding system of Gao et al. to include the noise

suppressing techniques of Mauro in order to stop suppressing noise outside a predetermined frequency band (i.e. human auditory frequency bands). Stopping of unnecessary noise suppression saves processing time and computing power.

Regarding claims 15-18, Gao et al. do not show:

the noise suppressor comprising a parameter setting means for setting a parameter so as to select an optimal noise suppression characteristic.

parameters are set in accordance with the used coding algorithm and the used coding rate.

However, Mauro teaches:

a noise suppressor comprising a parameter setting means (col.10, L.8-13) for setting a parameter so as to select an optimal noise suppression characteristic, said parameters varies the noise suppression characteristics (col.10, L.13-29). [Look-up table contains channel gain parameters. Using gain parameters according to a frequency band from multiple bands provide less voice quality degradation (i.e., optimal noise suppression characteristic selection based on parameter setting.)]

parameters are set in accordance with the used coding algorithm and used coding rate at the speech encoder. [Rate determination provides information on the presence and absence of speech (col.6, L.14-23). This rate determination information is provided to the noise suppressor 108 by the variable rate vocoder (col.6, L.57-59). The presence and absence of speech (signal and noise energy) is used to determine SNR (col.2, L.55-60) and thus the channel gains and channel gain adjustment (col.1, L26-36; col.2, L.26-34). Look-up table contains channel gain parameters (col.10, L.8-13).

Therefore, it can be seen that channel gain parameters are determined in accordance with the used coding algorithm and the used coding rate.]

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the decoding system of Gao et al. to include the parameter setting means of Mauro in order to set the parameters to select the optimal noise suppression characteristics. Parameters contained in look-up table format can be processed efficiently by digital signal processing system.

Claims 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mauro in view of Ashley (US Patent No. 5,659,622).

Regarding claim 23, Mauro shows:

a signal processing apparatus (Fig.1, 100) comprising:

a noise suppressor (Fig.1, 108) having a plurality of different noise suppression characteristics (col.1, L.26-36; col.2, L.26-34, col.3, L.16-37), suppressing background noise contained in a speech signal (col.3, L.60-63). [The use of spectral subtraction technique in noise suppression to determine, in a frequency band, the signal-to-noise ratio (SNR), the channel gains, and channel gain adjustment is indicative of the presence of different noise suppression characteristics of the noise suppressor.]

a speech encoder having a plurality of different coding algorithm (rate decision algorithm), encoding the suppressed speech signal by using one of said different coding algorithm (col.5, L.58-65; col.6, L.2-13, L.23-24); [Different coding algorithms within the variable rate vocoder can be used to select one of the four rates, i.e., one algorithm to

select the 171 information bits per 20ms rate (8.5Kbps), another algorithm to select the 80 information bits per 20ms rate (4Kbps), etc...] and

wherein said noise suppressor selects one noise suppression characteristic in accordance with the used coding algorithm at the speech encoder. [Rate determination provides information on the presence and absence of speech (col.6, L.14-23). This rate determination information is provided to the noise suppressor 108 by the variable rate vocoder (col.6, L.57-59). The presence and absence of speech (signal and noise energy) is used to determine SNR (col.2, L.55-60) and thus the channel gains and channel gain adjustment (col.1, L26-36; col.2, L.26-34). The use of spectral subtraction technique in noise suppression to determine, in a frequency band, the signal-to-noise ratio (SNR), the channel gains, and channel gain adjustment is indicative of the presence of different noise suppression characteristics of the noise suppressor. Therefore, it can be seen that the determining or selecting of noise suppression characteristic is based on the used coding algorithm (rate information).]

Mauro does not show:

the signal processing apparatus having applications in a mobile radio communication terminal.

However, Ashley teaches:

the method and apparatus for suppressing noise having applications in a mobile station (col.2, L.67, col.3, L.1-11).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the signal processing apparatus of Mauro to include the

method and apparatus for suppression noise in a mobile communication system as taught by Ashley in order to implement the apparatus having broader applications in different communication systems.

Regarding claim 23, Mauro shows:

a signal processing apparatus (Fig.1, 100) comprising:

a noise suppressor (Fig.1, 108) having a plurality of different noise suppression characteristics (col.1, L.26-36; col.2, L.26-34, col.3, L.16-37), suppressing background noise contained in a speech signal (col.3, L.60-63). [The use of spectral subtraction technique in noise suppression to determine, in a frequency band, the signal-to-noise ratio (SNR), the channel gains, and the channel gain adjustment is indicative of the presence of different noise suppression characteristics of the noise suppressor.]

a speech encoder having a plurality of different coding rates (variable rate), encoding the suppressed speech signal by using one of said different coding rates (col.5, L.58-65; col.6, L2-13); [The variable rate vocoder may use one of the four rates, 16, 40, 80, or 171 information bits in 20ms data frames (0.8Kbps, 2Kbps, 4Kbps, or 8.5Kbps) to encode the data.] and

wherein said noise suppressor selects one noise suppression characteristic in accordance with the used coding rate at the speech encoder. [Rate determination provides information on the presence and absence of speech (col.6, L.14-23). This rate determination information is provided to the noise suppressor 108 by the variable rate vocoder (col.6, L.57-59). The presence and absence of speech (signal and noise energy) is used to determine SNR (col.2, L.55-60) and thus the channel gains and

channel gain adjustment (col.1, L26-36; col.2, L.26-34). The use of spectral subtraction technique in noise suppression to determine, in a frequency band, the signal-to-noise ratio (SNR), the channel gains, and the channel gain adjustment is indicative of the presence of different noise suppression characteristics of the noise suppressor. Therefore, it can be seen that the determining or selecting of noise suppression characteristic is based on the used coding rate.]

Mauro does not show:

the signal processing apparatus having applications in a mobile radio communication terminal.

However, Ashley teaches:

the method and apparatus for suppressing noise having applications in a mobile station (col.2, L.67, col.3, L.1-11).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the signal processing apparatus of Mauro to include the method and apparatus for suppression noise in a mobile communication system as taught by Ashley in order to implement the apparatus having broader applications in different communication systems.

Allowable Subject Matter

6. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 24-27, Mauro shows:

a noise suppressor with different noise suppression characteristics;

a speech encoder with different coding algorithm and coding rates;

parameter setting means.

However, Mauro or other references do not show the following claimed relationships:

$P \geq Q > 1$;

$R \geq Q > 1$; and

$R \geq S > 1$.

Where,

P = number of coding algorithm;

Q = number of noise suppression characteristics;

R = number of coding rates;

S = number of parameters; and

P, Q, R, and S are positive integers.

Conclusion

1. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent Documents:

A). 6,141,639	10/2000	Thyssen
B). 2001/0001853 A1	05/2001	Mauro et al.
C). 5,812,970	09/1998	Chan et al.

D). 6,496,798 B1 12/2002 Huang et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tim Lao whose telephone number is 703-305-8955. The examiner can normally be reached on M-F, 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Doris To can be reached on 703-305-4827. The fax phone number for the organization where this application or proceeding is assigned is 703-305-9508.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-9000.

Tim Lao
Examiner
Art Unit 2655

TL
11/20/2003

12/1/03
DORIS H. TO
SUPERVISORY PATENT EXAMINER
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